## REMARKS

Applicants wish to thank Examiner Ramsey for the courtesy of a telephone conference on August 14, 2003, wherein Examiner Ramsey affirmed the subject matter of dependent Claims 140 and 142 would be allowed if rewritten in independent form. Accordingly, applicants reserve the right to file independent claims if the amended claims and comments contained herein do not indicate that the case is allowable.

The present invention specifically addresses an aging process to improve plasma display panel luminescence characteristics. As noted on page 35 of our present specification, the present inventors found that deterioration in a blue phosphorous layer during an aging process of a plasma display panel can be the result of deterioration caused by a gas including steam generated during the aging process. Thus, the present invention as set forth, introduces a discharge gas having a partial steam pressure of no more than 15 Torrs in the aging process.

As noted in each of the independent Claims 112 and 131, we are addressing a specific aging process after the front and back plate have been formed and sealed together so that an inner space is formed therebetween and a discharge gas is introduced into the inner space with a required discharge voltage applied to the discharge electrodes in a particular cycle.

As the Office Action is aware, this is relative crowded art with a number of highly skilled engineers and scientists trying to economically improve both production results and cost in the formation of display panels. The present inventors have addressed specifically a deterioration problem with a significant impact on the blue phosphorous layer.

The aging process of Claim 112 includes: (i) an introducing process in which discharge gas with a partial steam pressure of no more than 15 Torr is newly introduced into the inner space from outside; and (ii) an evacuating process in which the discharge gas is evacuated from

the inner space, where a discharge produced when a required discharge voltage is applied to the discharge electrodes is divided into a plurality of discharge periods. The introducing process is performed together with the evacuating process in intervals between discharge periods, thereby enabling the discharge gas to be circulated through the inner space.

The aging process of Claim 131 includes: (i) an introducing process in which discharge gas is newly introduced into the inner space from outside; and (ii) an evacuating process in which the discharge gas is evacuated from the inner space. The introducing process and the evacuating process take place with respect to each other to enable discharge to be produced by applying a required discharge voltage to the discharge electrodes while circulating discharge gas through the inner space. The discharge gas introduced in the introducing process has a partial steam pressure of no more than 15 Torr, and in the aging process the discharge gas is circulated intermittently through the inner space.

In general, the light-emitting characteristics of the phosphors (especially, blue phosphor: $BaMgAl_{10}O_{17}$: Eu) are deteriorated during the aging process. The aging process is performed in a final stage of the PDP[1] manufacturing procedures. In the aging process, to stabilize luminescence and discharge characteristics, electricity is discharged for a short time under stricter conditions than in driving the PDP by using a dedicated driving circuit. In the aging process, a larger voltage than required can be applied to prevent a discharge failure that may occur due to variation in the discharge voltage.

The aging process has experienced a problem, however, in that the blue phosphor is deteriorated. Since the aging process is performed last in the PDP manufacturing procedures, the deterioration in the blue phosphor directly leads to deterioration in characteristics of the manufactured PDP. The deterioration of phosphors is considered to be caused by gas, including

steam, generated during the aging process by the protective MgO layer on the front plate, to impact the phosphor layer formed on the back plate and the partitions, compounded by deterioration caused by ion impact and vacuum ultraviolet irradiation generated by a discharge during the aging process. The stricter the condition under which the discharge is performed, the worse the deterioration of the blue phosphor.

The invention of Claims 112 and 131, after amendment, prevents the blue phosphor ($BaMgAl_{10}O_{17}$: Eu) from being deteriorated during the aging process by adjusting the partial steam pressure of the discharge gas, where steam is considered to be one of the causes of the phosphor deterioration, to a lower degree than before. This is achieved by an evacuating process in which the discharge gas and gases including steam that are generated during the discharges are evacuated from the inner space.

Also, to ensure the effect of preventing the blue phosphor from being deteriorated, Claims 112 and 131 define that the discharge gas introduced in the introducing process has a partial steam pressure of no more than 15 Torr. This is supported by the following description in our specification: "If the results shown in Figs. 14 and 15 are also taken into account, the partial pressure of the steam in the gas circulated through the space between the plates should be of 15 torr or less (i.e. have a vaporization point of 20°C or lower). The lower the partial pressure of the steam the more the deterioration in luminescence characteristics for the phosphors can be limited, . . ."

It was not until the inventors detected that the above-described mechanism deteriorates light-emitting characteristics of phosphors (especially a blue phosphor containing $BaMgAl_{10}O_{17}$: EU) and found that the problem could be solved by decreasing the partial steam pressure of the discharge gas that the invention of Claims 112 and 131 took form.

The Office Action rejected Claim 128 as being anticipated by the *Inoue et al.* (U.S. Patent No. 6,236,159) and contended that the method of aging as recited in Claim 112 fails to distinguish the display structure from that claimed in the *Inoue et al.* reference. It is believed the emphasis on the blue phosphorous layer in independent Claim 112 provides additional structure to address the improvements found in the display panel of the present invention resulting from the method described in Claim 112 for aging.

The *Inoue et al.* reference's primary concern is with providing a number of different configurations of gas flow barriers and a peripheral space on the panel to increase the gas flow between each of the barriers. *Inoue et al.* teaches an evacuation of the display panel in a cleaning process with the panel then cooled to room temperature, and at that point, a discharge gas is introduced into the panel to finish the production. The application of a voltage to address the possibility of impurity gases absorbed on the surface of a protective layer is disclosed in the fourth and fifth embodiments seen, for example, in Column 16, Lines 13-67.

In addition, the *Inoue et al.* reference further teaches highly ionizing the cleaning discharge gas into a plasma gas by applying a voltage to cleaning electrodes that are provided outside the display area or even ionizing the cleaning gas before it is introduced into the plasma display panel. See Column 19, Lines 15-24.

When compared to the *Inoue et al.* reference, the present claims that are directed to the process of our present invention help prevent the deterioration of a phosphorous layer, and more particularly, a blue phosphorous layer, after our plasma display panel has been preliminarily cleaned and appropriately formed so that the front and back plates are sealed together. Our required discharge voltage is supplied with the discharge gas introduced into the inner space while having a partial steam pressure of no more than 15 Torr. The gas introduction process and

the gas evacuation process occur in intervals between the discharge periods. Unlike the *Inoue et al.* reference which teaches discharging during the initial cleaning step, and more particularly, during a gas introduction process wherein the cleaning gas is introduced in intervals, and the electric discharge from the discharger 44 occurs when the cleaning gas inlet valve is opened. See, for example, the time chart disclosed on Figure 30.

Thus, the *Inoue et al.* reference is directed to a gas discharge panel and evacuation method thereof and discloses that gases such as $H_2O$ can be removed from the panel by introducing and expelling gases in the form of a cleaning discharge gas. As noted in the Office Action, at Column 19, Lines 4-6 of the *Inoue et al.* reference indicate that the introduction of the cleaning discharge gas may be repeated any number of times as required. Further, in Column 19, Lines 47-50, it is stated that the operation of causing the electric discharge in the PDP by an introduction of the cleaning discharge gas may be repeated by performing any number of times at suitable temperatures.

The *Inoue et al.* reference does not mention nor address the particular problem of deterioration in brightness caused by the deterioration of the blue phosphorous layer. It also does not disclose a subsequent process after the cleaning gas operation as defined in our present claims.

The Office Action further rejected Claims 112, 126, 128, 131-136 as being unpatentable over the *Inoue et al.* reference in view of the *Ahearn et al.* article and the *Carretti et al.* (U.S. Patent No. 6,472,819). The *Ahearn et al.* reference is directed to A/C plasma display panels of 1978 and noted that $H_2O$ can be found to be a contaminant in the protective thin MgO layer.

The *Ahearn* reference apparently suggests a cleaning process during the firing of the panels for sealing them together while at the same time using an oxygen discharge processing. See second column, page 624.

The Office Action sought to incorporate this disclosure, as noted in the *Carretti et al.* (U.S. Patent No. 6,472,819) under 35 U.S.C. § 103. The *Carretti* reference, however, has a filing date of October 7, 1998, which is significantly after the respective priority dates of the present application.

The *Carretti et al.* reference further is primarily designed to provide a non-evaporable getter system that addresses a need to absorb gaseous impurities that are subsequently generated in the inner space during the display service life. Thus, as can be noted in the respective claims, the location and the specific getter material is the prime teaching of this reference. Neither this reference nor the *Ahearn et al.* reference recognizes nor addresses the problem of deterioration of the blue phosphorous layers during an aging process in the production of the panels.

Claims 127, 129, 137-139, 141, and 143-150 were further rejected over a combination of *Carretti et al.*, *Ahearn et al.* and the *Wilson* (U.S. Patent No. 3,778,126).

More specifically, the *Wilson* reference was relied upon to teach a sealant that has a low melting glass and wherein barriers can be formed to prevent the inward flow of the gas sealant. The Office Action did not acknowledge, however, that the *Wilson* reference specifically teaches that both the evacuating gas filling and heating functions are performed within an oven enclosure, and that there is never a differential in the pressure exerted upon the glass parts of the panel assembly. Thus, by utilizing at all times an equalized pressure, purportedly the gas plates do not need a central support and can be of a thinner configuration. As can be readily appreciated, the present invention sets forth a procedure for introducing a discharge gas and then

evacuating the discharge gas while activating discharge electrodes at a required discharge voltage.

While it is appreciated that the *Wilson* reference was sought as a teaching to supplement the disclosure, it is submitted that the diverse nature of these four references is indicative of an aggregation of references and hindsight from the teaching of the present invention. That is, there has been a selective picking and choosing from each of the references to the effect that it will only support a given position to the exclusion of other parts necessary to reach a full appreciation of what each reference would fairly suggest to one skilled in the art; see *In Re Wesslau*, 147 USPQ 391, 393 (CCPA 1965). Additionally, applying the standards of 35 U.S.C. § 103 should take into account the practical impact of the present invention in a relatively crowded field.

> Thus when differences that may appear technologically minor nonetheless have a practical impact, particularly in a crowded field, the decision-maker must consider the obviousness of the new structure in this light.
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> *Continental Can Co. USA Inc. v. Monsanto Co.*,
> 20 USPQ 2d 1746, 1752 (Fed Cir. 1991).

Finally, as recently noted by the Board of Appeals in *Ex Parte Hillyer*, 68 USPQ2d 1222 (2003), the proper standard is not "obvious to try" under 35 U.S.C. § 103, but rather cited references (which are four in the present case) require a teaching reference to establish a *prima facie* obviousness of the claimed invention, and not simply that a person skilled in the art might find it "obvious to try" various combinations. The prior art must provide a specific teaching of the particular claim elements set forth in our claims. It is respectfully submitted that the art cited of record, alone or in combination, does not meet this standard.

Accordingly, it is requested that the case be indicated allowable, and an early notification of the same indicated. If the Examiner believes that a telephone interview will help further the

prosecution of this case, he is respectfully requested to contact the undersigned attorney at the listed telephone number.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on November 10, 2003.

By: James Lee

Signature

Dated: November 10, 2003

Very truly yours,

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